

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of cleaning an interior of a treatment apparatus ~~for removing to remove~~ a metal film formed on an inner wall of the treatment apparatus, ~~inside a~~ the treatment apparatus ~~that is~~ configured to form a ~~the~~ metal film on a substrate, the treatment apparatus comprising (a) a first source supplying a treatment agent; (b) a second source supplying a cleaning agent comprising one of a carboxylic acid and a derivative of a carboxylic acid; (c) a vaporizer vaporizing the treatment agent and the cleaning agent; (d) a first pipe connecting the first source and the vaporizer, and supplying the treatment agent from the first source to the vaporizer; (e) a second pipe connecting the second source and the vaporizer, and supplying the cleaning agent from the second source to the vaporizer; (f) a chamber for forming the metal film on a substrate; (g) a susceptor mounting the substrate in the chamber; (h) a third pipe connecting the vaporizer and the chamber, and supplying the vaporized treatment agent or the vaporized cleaning agent from the vaporizer to the chamber; (i) a vacuum pump exhausting the chamber; and (j) a heat source heating the vaporizer, the third pipe, and the chamber, the method comprising:

- (i) forming the metal film inside the chamber;
- (ii) reducing a pressure in the chamber, ~~the third pipe, and the vaporizer~~;
- (iii) heating the vaporizer, the third pipe, and the chamber by the heat source over a predetermined temperature;
- (iv) supplying the cleaning agent comprising one of the carboxylic acid and the derivative from the second source to the vaporizer through the second pipe to vaporize the cleaning agent;
- (v) supplying the vaporized cleaning agent from the vaporizer into the chamber through the third pipe;
- (vi) reacting the metal of the metal film and the vaporized cleaning agent to form a metal complex of the metal and the cleaning agent;
- (vii) subliming the metal complex by a heat of the heat source; and
- (viii) exhausting the sublimed metal complex by the vacuum pump to clean the chamber.

2. (Cancelled).

3. (Currently Amended) The method of ~~cleaning~~ of claim 1, wherein one of the carboxylic acid and the derivative comprises a compound selected from the group comprising RCOOH, RCOOR', and R(COOH)_n, wherein R, R' are hydrocarbon groups containing halogen atoms, and wherein n is an integer.

4. (Currently Amended) The method of ~~cleaning~~ of claim 1, wherein the carboxylic acid comprises trifluoroacetic acid.

5. (Currently Amended) The method of ~~cleaning~~ of claim 1, wherein the treatment apparatus is a chemical vapor deposition equipment.

6. (Cancelled).

7. (Currently Amended) The method of ~~cleaning~~ of claim 1, further comprising: supplying an additive to the vaporized cleaning agent to promote formation of the metal complex of the cleaning agent and the metal.

8. (Currently Amended) The method of ~~cleaning~~ of claim 7, wherein the additive includes oxygen or water vapor.

9. (Currently Amended) The method of ~~cleaning~~ of claim 1, further comprising: repeating said supplying the cleaning agent, repeating said supplying the vaporized cleaning agent, repeating said reacting the metal and the vaporized cleaning agent, and repeating said subliming the metal complex.

10. – 16. (Cancelled).

17. (Currently Amended) The method of ~~cleaning~~ of claim 1, wherein the metal is copper.

18. (Currently Amended) The method of ~~cleaning~~ of claim 17, wherein, in said subliming the metal complex, the metal complex is copper complex and the copper complex is heated at a temperature of at least 150°C.

19. (Currently Amended) The method of ~~cleaning~~ of claim 17, wherein, in said reacting the metal and the vaporized cleaning agent, the pressure of the vaporized cleaning agent is at least 10 Torr.

20. (Cancelled).

21. (Currently Amended) The method of ~~cleaning~~ of claim 17 1, further comprising:

confirming the existence of the ~~material~~ metal film inside the chamber; and
repeating said supplying the cleaning agent, repeating said supplying the vaporized cleaning agent, repeating said reacting the ~~copper~~ metal of the metal film and the vaporized cleaning agent to form a metal complex of the metal and the cleaning agent, and repeating said subliming the ~~copper~~ metal complex, if the existence of ~~material~~ the metal film inside the chamber is confirmed.

22. (Currently Amended) The method of ~~cleaning~~ of claim 17, wherein in forming the metal film, the metal film including copper is formed from Cu⁺¹ (hexafluoroacetylacetone) and silylolefin ligand.

23. (Currently Amended) The method of ~~cleaning~~ of claim 22, wherein the silylolefin ligand is selected from the group consisting of trimethylvinylsilane (TMVS), dimethoxymethylvinylsilane (DMOMVS), methoxydimethylvinylsilane (MODMVS), trimethoxyvinylsilane (TMOVS), triethoxyvinylsilane (TEOVS), ethoxymethoxymethylvinylsilane (EOMOMVS), diethoxymethylvinylsilane (DEOMVS), diethoxymethoxyvinylsilane (DEOMOVS), ethoxydimethoxyvinylsilane (EODMOVS), ethoxydiethylvinylsilane (EODEVS), diethoxyethylvinylsilane (DEOEVS), dimethoxyethylvinylsilane (DMOEVS), ethoxydimethylvinylsilane (EODMVS), methoxydiethylvinylsilane (MODEVS) and ethylmethoxymethylvinylsilane (EMOMVS).

24. – 27. (Cancelled).

28. (Currently Amended) The method of cleaning of claim 1, wherein in said heating, the predetermined temperature is 300 °C.

29. – 30. (Cancelled).

31. (Currently Amended) The method of cleaning of claim 1, further comprising:
supplying water vapor into the chamber,
wherein the carboxylic acid is trifluoroacetic acid, and
reacting includes reacting the metal and the vaporized cleaning agent in a presence of the supplied water vapor.

32. (Currently Amended) The method of cleaning of claim 1,
wherein the vaporizer has a first opening, a second opening, and a third opening between the first opening and the second opening,
the first pipe connects to the first opening of the vaporizer,
the second pipe connects to the third opening of the vaporizer, and
the third pipe connects to the second opening of the vaporizer.